BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

IN RE APPLICATION NO. 96-1	)
	)
OLYMPIC PIPE LINE COMPANY:	)
CROSS CASCADE PIPELINE PROJECT	)
	)
	)

EXHIBIT _____ (RB-T)

REBUTTAL TESTIMONY OF RONALD BRENTSON

ISSUES: LEAK PREVENTION & DETECTION

SPONSOR: OLYMPIC PIPE LINE COMPANY

Q. State your name.

A. Ronald Brentson

Q. Please summarize the issues that you will address in your testimony.

A. My testimony will respond to testimony provided by other witnesses concerning pipeline leak detection issues. In particular, I have focused on the testimony submitted by James W. Miller (CFE), Charles Batten (CCA) and John Mastandrea (CCA). In responding to that testimony, I will address four general topic areas:

(1) My background and experience.

(2) Olympic Pipe Line Company's philosophy and policies regarding leak prevention and detection.

(3) The leak detection methods that Olympic plans to utilize in connection with the Cross Cascade Pipeline Project.

(4) The various additional and alternative leak detection methods proposed by other witnesses.

Background and Experience

Q. What is your current occupation?

A. I am Supervisor of Product Movements for Olympic Pipe Line Company (Olympic), based in Renton, Washington. I have management responsibility for the Control Center, the Scheduling Department and the Computer Technology Group. Among other things, I am responsible for developing standard operating procedures for Control Center Operators.

Q. Please describe your employment history with Olympic Pipe Line Company.

A. I joined Olympic in 1972, as an Operator working in the Mount Vernon-Anacortes area of the system. In that capacity, I assisted in various operational activities, such as batch changes and meter provings. I was also responsible for inspection and maintenance of facilities along

portions of the route. In 1973, after several months of training, I became a Control Center Operator, operating the pipeline remotely from the Control Center in Renton using the Supervisory Control and Data Acquisition (SCADA) system. In 1986, I was assigned to a project team working to develop and implement a third-generation SCADA system for use on the Olympic system. In 1989, when that new system came on line in Renton, I became Assistant to the Control Center Supervisor. In 1991, the company reorganized the management, and following that reorganization, I became the Control Center Supervisor. In 1994, I took over my current position as Supervisor of Product Movements, with responsibilities over the Scheduling Department and the Computer Technology Group as well as the Renton Control Center and Product Accounting.

Q. What is the "Control Center" that you mentioned?

A. The Control Center is the room located at Renton Station from which Operations Controllers remotely control operations on the Olympic pipeline system. The room itself contains a large, semi-circle desk containing stations for two or more Controllers. Eight computer monitors display information from the SCADA system and the Pipeline Leak Detection System (PLDS). Two Control Center Controllers are on duty at all times, monitoring the information displayed on computer screens, controlling the shipment and distribution of product on the pipeline system, responding to anomalies or problems reflected in the displayed information, and communicating with and coordinating the activities of Olympic personnel at other locations.

<u>Olympic's Leak Prevention & Detection Philosophy</u>

Q. Can you describe Olympic's approach to Leak Prevention and Detection?

A. Yes. Olympic is committed to operating its pipeline in an environmentally sound manner. Olympic has invested in a sophisticated SCADA and accompanying computerized dynamic model leak detection system, and Olympic continues to devote resources to enhancing those systems, by upgrading hardware and software. These systems are not required by federal or state

regulations, and in fact, some pipeline systems in the United States do not have a SCADA system to control pipeline operations and most do not have a computerized leak detection system. Olympic continually works to improve its pipeline design and operation to minimize the possibility of leaks or spills.

Q. In his testimony, Charles Batten (CCA) contrasts the "economic mindset" of operating a pipeline to a preferred "safety and environmental mindset."

A. I would point out that Mr. Batten appears to be speaking about pipelines in general. He does not offer any opinion about Olympic Pipe Line Company. Indeed, in his deposition, he conceded that he has no information regarding Olympic's operation.[1]

Q. How would you describe Olympic's approach to operating its pipeline?

A. I believe Olympic operates its pipeline in a manner that is consistent with the "safety and environmental mindset" that Mr. Batten describes. Environmental protection is a priority for Olympic. There may have been a time when some pipeline companies treated leaks and spills as a normal and acceptable part of doing business. Olympic does not. We are a Washington company. Our employees live here and raise their families here. We respect and value the natural resources that we enjoy in the Pacific Northwest, and we work hard to prevent any releases of product.

Q. Can you describe the training provided to Operations Controllers in particular?

A. Yes. The Operations Controllers' training is a process that currently takes between 9 months to 1 year. Training is typically done by one or two experienced, senior Operations Controllers. The process is formalized through documentation of proficiency, signed by the trainee, the instructor,

---

[1] Deposition of Charles Batten at 55:

Q. Have you ever seen any of Olympic's existing pipeline operation?
A. No, I have not.
Q. Have you ever spoken with anyone from Olympic Pipeline?
A. No, I have not. Not to my knowledge. . . .

Excerpts of this deposition are attached as Exhibit RB-2.

and myself. Final approval is given by Olympic's manager, following a face-to-face review of training criteria. The length of the training period is determined based on variables such as prior pipeline experience and prior control center experience. The training itself includes a complete overview and understanding of issues such as:

- Facility equipment and its operation
- Protective equipment and respective settings
- Pipeline layout, including volume and length information
- Product specifications and quality control guidelines
- Pipeline accounting practices.
- Metering and proving basics.
- Standard operating procedures for product changes at all locations
- System operating pressures
- System hydraulics, centrigual and PD pumps, and control valve operations
- SCADA parameters, settings and communications
- Pipeline Leak Detection System (PLDS)
- Regulatory agencies and jurisdiction
- Power costs, station demand, historical demand and energy charges
- Good working knowledge of spill response plan, safety procedures manual, pipeline profile drawings, protective and control device drawings, valve charts, receipt and delivery schematics, operations and maintenance procedures manual, training manual for control center operations, and operations manual for controllers
- Ability to respond to abnormal conditions, emergency conditions, emergency notifications, one-call notifications and computer outages

Q. Mr. Batten testified that "control center operators receive extensive training on how to keep the pipeline transporting product and compared to the operating training, they

receive little training on recognizing leaks or ruptures and the importance of promptly shutting down the pipeline." What is your reaction to his testimony?

A. Again, he is not speaking about Olympic. Mr. Batten conceded in his deposition that he had no information about Olympic's training.[2]

Q. Is Mr. Batten's description accurate with respect to Olympic's training?

A. No. At Olympic, we emphasize safety and environmental responsibility. For example, the Olympic Operations Manual for Controllers begins with the following statement:

> Each Olympic Pipe Line Company employee has the responsibility to: 1) **prevent** releases, and 2) if a release does occur, to minimize its consequences. Meeting agreed upon pipeline schedules and minimizing costs are also important responsibilities, but neither take precedence over the safety of employees, the public and the environment. If there is any reason to believe that a release might occur or has occurred, the pipeline system should be immediately shut down and promptly investigated.

Portions of the Olympic Operations Manual for Controllers are attached as Exhibit RB-1.

Q. Mr. Batten also testified that, "[o]nly after not being able to justify the cause of the alarm as being an operational problem will an operator begin to consider if the cause might be indicative of a product release. While a pipeline operator might shut down pumps, often other action will not be taken until on site leak verification is made." Is this true at Olympic?

A. No. As explained above, it is Olympic's policy to shut down the pipeline if there is any reason to believe that a release has occurred or might occur.

Q. Mr. Batten also recalled the questioning of a pipeline operator after a spill incident in another part of the country. Mr. Batten testified that the operator in question stated that

---

[2] Deposition of Charles Batten at 120:

Q. Do you have any information about, or knowledge of, the training that Olympic provides to its operators?

A. No. I have information on various training performed in companies of their controllers.

he was reluctant to shut down the pipeline on his own and typically called the shift supervisor instead. Further "[w]hen asked if there was a personal penalty for shutting the pipeline down on his own accord, [the operator] advised that he didn't know and added that if you just kept shutting the pipeline down he was sure that management would frown on you." Is that true at Olympic?

A. No. At Olympic, Operators (or "Controllers") have the authority and responsibility to shut down the line if there is any reason to believe that there is a problem. The Operations Manual states:

> The Controller will shut down a system or necessary segments of a system when: 1) fluctuations of pressure and flow indicate a probable release from the pipeline, or 2) reported by Olympic personnel, air patrol or outside sources. In such emergencies, the Controller has full responsibility and total authority to make shutdown decisions and take appropriate actions. . . . The Controller has the freedom to make the decision based on the available information, his experience and training.

Ex. RB-1 at 4. No one ever second-guesses an Operator's decision to shut down the pipeline to investigate a situation. To my knowledge, there has never been an instance in which an Operator has been reprimanded for shutting down the pipeline.

Leak Detection Methods

Q. Some witnesses have criticized the approach to leak detection set forth in the Site Certification Application for the Cross Cascade Pipeline. Can you summarize the different methods of leak detection that Olympic will utilize in connection with the Cross Cascade Pipeline Project?

A. Sure. Olympic will rely upon several different levels of leak detection:

First, Olympic will operate the Cross Cascade Pipeline with a sophisticated Supervisory Control and Data Acquisition (SCADA) system that provides Control Center Operators with continuous, real-time information concerning the flow of product through the system.

Second, Olympic will operate the Cross Cascade Pipeline with a computerized Pipeline Leak Detection System (PLDS) developed by Jerry Modisette of LIC Energy Systems.

Third, Olympic will conduct frequent visual inspections of the pipeline route and associated facilities.

Fourth, Olympic will conduct periodic internal line inspections with magnetic flux leakage (MFL) and caliper inspection tools, commonly known as "smart pigs."

Fifth, Olympic will conduct regularly scheduled static pressure tests of the Cross Cascade Pipeline.

Sixth, Olympic will conduct an active community information program, designed to encourage third parties to report any unusual conditions that may indicate that a release has occurred.

Q. Let's discuss each of these leak detection methods in turn. First, could you please describe the SCADA system in greater detail?

A. Yes. The SCADA system is the basic control and data acquisition system that allows Olympic to operate the pipeline system remotely. Olympic has used a SCADA system to remotely operate the pipeline since it was first built in the mid-1960s. Although operating procedures used at that time would seem primitive by today's standards, Olympic was one of the first pipelines to be operated remotely from a centralized control center. Indeed, even today, there are some pipeline systems in the United States that do not have SCADA systems.

In 1989, Olympic installed its current SCADA system, a customized Vector SCADA system that engineers from Control Applications, Mobil and Olympic worked together to design specifically for Olympic's pipeline. This system gathers real-time information about conditions on the pipeline and displays that information for Control Center operators, allowing them to schedule deliveries and monitor the system for abnormal conditions. The information gathered by the system includes status information (such as whether a valve is open or closed, and whether a motor is on or off), analog information (such as the temperature, pressure and flow rate) and information from meter readings (such as batch volume and tank readings). The SCADA system

has evolved over time to gather more information, and update that information more frequently and more effectively. The SCADA system now reports information from more than 4000 different data points and updates that information on 5 to 6 second intervals. The capability of the system is determined in part by the speed and capacity of the computers on which the system is operated. Olympic operates its SCADA system on mainframe DEC computers located in Renton, and programmable logic controllers (PLCs) located at each station on the system. In the next year or two, Olympic intends to enhance its SCADA system with both hardware and software upgrades. Olympic will replace the existing mainframe computers with DEC Alpha machines of at least 450 mHz, and Olympic will change the software to a Windows-based system that will offer additional functionality. Over time, Olympic also intends to transition the existing SCADA system to a so-called "open vector" system, which will further enhance the capabilities of the system.

In order to operate the proposed Cross Cascade Pipeline, Olympic will expand upon its existing SCADA system, adding more than a thousand data points to the information collected. Olympic will also install equipment necessary to measure temperature and pressure at each valve on the proposed Cross Cascade Pipeline, enhancing the system's ability to monitor conditions on the pipeline.

Q. How is the SCADA system used to detect a leak?

A. The SCADA system provides real-time information concerning the flow of products through the pipeline system. An inadvertent release of product or rupture of the pipe would be reflected in anomalous measurements of volume, pressure or other parameters reported by the SCADA system. Experienced Control Center Operators could detect some releases immediately by the measurements reported by the SCADA system. Indeed, the SCADA system will set off alarms of its own under certain conditions, such as a loss of pressure or change in flow.

Q. The second leak detection method you mentioned was a computerized leak detection system. Is that something different than the SCADA system you just described?

A. Yes. In addition to the SCADA system, Olympic operates a Pipeline Leak Detection System (PLDS) developed by Jerry Modisette. The PLDS utilizes a dynamic mathematical model designed to simulate the behavior of the pipeline. By comparing actual data tracked by the SCADA system to values predicted by the model, the system is able to detect leaks. The PLDS basically compares modeled values with actual values measured by the SCADA system and declares an alarm when the difference between modeled and actual values exceeds certain preset parameters.

Q. In his testimony Charles Batten states that "the application does not have a monitoring system adequate to alert a controller of ruptures or leaks with sufficient precision to recognize that immediate action should be taken to shut down the pumps, close appropriate remote-controlled valves, and dispatch to the area of release crews to immediately begin actions to minimize the quantity of product released and to begin clean-up operations." (Ex. CHB-3 at 23.) Do you agree with this statement?

A. No. The PLDS is designed to do exactly that. In his deposition, Mr. Batten conceded that he is unfamiliar with the Modisette system and based his opinions on the abbreviated description of that system found in the Application and a brochure given to him by another witness.[3] Had he

[3] Deposition of Charles Batten at 58-59:

Q. What's the basis of your knowledge about the Modisette pipeline leak detection system?
A. Primarily the review of its technical data that was provided –
Q. When you say "technical data," what do you mean?
A. The technical data that was provided in the – either in the proposal or associated with the proposal and provided late, the material I said that I think John Mastandrea was the one that sent to me, and it was their document.

***

Q. Have you ever spoken with anyone who works for Modisette & Associates?
A. No, I have not.
Q. When's the first time you heard about the Modisette leak detection system?

(continued...)

sought additional information about the system, he would have discovered that it has all of the capabilities he has identified.

Q. Mr. Batten also implies that the PLDS is not a "state-of-the-art" leak detection system. Do you agree with Mr. Batten?

A. No, I do not, and again, I must point out that it appears as if Mr. Batten has very little information about the Modisette system. The Modisette system that Olympic uses is one of a handful of dynamic computer modeling systems available, and Olympic has devoted considerable resources over the years to enhance the system and keep pace with the "state-of-the-art." While there may be some leak detection systems that are better suited for other pipeline operations, we believe that the Modisette system is the best available technology for use on the Olympic system. Over the years, Olympic has considered many different leak detection systems and we have yet to come across any system that we believe would be more effective than the Modisette system at detecting leaks on our pipeline. We have worked with the Modisette system to enhance its capabilities over the years and, as technology continues to advance, we will continue to enhance the leak detection system. As mentioned above, Olympic will install instrumentation to measure temperature and pressure at all valves on the Cross Cascade Pipeline, which as Counsel for the Environment's witness James Miller testified, will increase the effectiveness of a leak detection system. (Ex. JWM-T at 41.)

Q. In his testimony, Mr. Batten also questioned the capability of the PLDS. Can you describe the system's capability?

A. Yes. The PLDS is capable of reliably detecting and locating a release of 1% of product flow within 15 minutes. In connection with a spill drill conducted with the Washington Department

---

(...continued)

A. Of all the years that I have worked in this business, this was the first time I had heard about that particular system.

of Ecology, Olympic ran a formal test of the system and the system proved capable of detecting a leak of 0.5% of product flow within 15 minutes. We have also conducted at least a dozen informal tests of the PLDS in which we have opened a valve at the Renton facility and determined whether the release would be detected by the PLDS. All of those informal tests confirmed the system's ability to consistently detect a leak of 1% of flow within 15 minutes. Our experience in evaluating non-leak conditions that have triggered alarms on the PLDS has also been consistent with this detection capability. None of this means that the system would not detect a smaller leak, although it might take more than 15 minutes to detect a smaller leak. Under certain conditions, of course, the system might detect a much smaller leak even faster than that, particularly if the leak were within a station, or if the line were operating at fairly steady state conditions.

Q. Is it possible to adjust the PLDS so that it is capable of detecting even smaller leaks?

A. Yes, in theory, but it might not make sense to do so in practice. As I explained, the PLDS works by comparing actual measurements of pressure, flow and other variables to modeled values. Theoretically, the actual and modeled values should be identical. In the real world, however, limitations on the accuracy of instrumentation create discrepancies between actual measurements and the values predicted by the model. When those discrepancies exceed established limits, the PLDS sounds an alarm. Where the discrepancy limits are set determines the sensitivity of the leak detection system. We could set those limits at zero, and the system would sound an alarm whenever there were any difference whatsoever between the actual and modeled values. If it were programmed to be that sensitive, however, the system would be sounding false alarms constantly. The task is to set the limits so that the system is sensitive enough to detect fairly small leaks, but so that it does not sound so many false alarms that it will be ignored. With our system, we are constantly working to adjust and tune the system to allow for maximum sensitivity while still minimizing false alarms. We are better at that now than we were when we

first implemented the system, and we anticipate that the technology will continue to improve in the future.

Q. Mr. Batton testified that there are computerized leak detection systems advertised as being able to detect a release of 0.1% of flow within minutes and would be able to locate the release within 1000 feet. Do you agree with that testimony?

A. Well, it is true that there are leak detection vendors who make those sorts of claims about their systems, and systems do exist that can detect 0.1% leaks under certain ideal conditions. For that matter, the Modisette system can do so under certain conditions. When used on Olympic's pipeline system, however, I do not believe any other systems currently available would perform as well as the Modisette system that we use. In his deposition, Mr. Batten conceded that the EFA system was the only system he could recall having claimed to be able to detect a release of 0.1% of flow. He also conceded that he had no real world experience with an EFA system and that he had not done anything to try to verify the vender's claims of the system's capabilities.[4] Olympic, in contrast, has tested several different systems (including the EFA system) and, those systems have not consistently performed on our pipeline at the level Mr. Batten describes. Based on our experience, we believe that the Modisette system is the best leak detection system for our pipeline at this time. We are, of course, continually monitoring the development and advancement of leak detection technologies and we would consider implementing different or additional systems if we believed they would achieve a better result.

Q. When he testifies about other leak detection systems, Mr. Batten appears to be referring to the system developed by Edward Farmer, commonly referred to as the "EFA" system. Is that a better system than the Modisette system?

[4] Deposition of Charles Batten at 66-67.

A. No. The EFA system lacks much of the capability found in the Modisette system. The EFA system merely compares pressure and flow measurements at various points along the pipeline, something that Olympic's SCADA system is capable of doing. The Modisette system is a dynamic computer model that takes many more variables into account than a simple EFA pressure point system. This complexity makes it a more sophisticated and better system for a pipeline like Olympic's that operates in a very dynamic and heavily automated world. Due to a number of physical devices on our system, such as check valves and other equipment, the EFA system was incapable of detecting any leakage during testing at our Seattle Delivery Facility. Indeed, Mr. Batten conceded in his deposition that real time transient modeling is the most sophisticated leak detection method in use.[5]

Q. Returning to the list of leak detection methods you mentioned, the third method was visual inspection. Could you please explain this in more detail?

A. Sure. In addition to using the latest leak detection technology, we employ reliable and effective visual observation of the pipeline route and facilities. Federal regulations require Olympic to conduct a visual inspection of the entire pipeline route at least 26 times a year. Olympic goes beyond this requirement, and conducts aerial inspections of the pipeline route on a weekly basis if the weather permits. Olympic also conducts on-the-ground visual inspections in any areas that are not readily observable by plane, and at all facilities. Olympic personnel visit and inspect stations daily, and visit and inspect valve sites at least once a week. In addition, Olympic personnel inspect facilities and line segments routinely in the normal course of conducting operations and maintenance work on the line. On the existing system, for example, there are approximately 35 operators and maintenance personnel working along the route and part of their job is to monitor portions of the line in their area. We have also been experimenting with the use

[5] Deposition of Charles Batten at 139-41.

of video cameras to monitor facilities remotely, and will consider using such cameras where appropriate on the proposed system.

Q. Some witnesses have questioned the value of aerial inspections. Do you believe the aerial inspections are worthwhile?

A. Yes. Aerial inspections serve an important leak prevention purpose. From the perspective of flying overhead, a pilot can see construction or excavation activities occurring near the pipeline that may result in damage to the pipeline. By observing these activities and alerting Olympic personnel to follow up by notifying third-parties of the pipeline's presence and providing on-site assistance and supervision, Olympic can prevent accidental releases that may otherwise have occurred. In addition to the leak prevention purpose, aerial inspections also serve an important leak detection purpose. Petroleum product releases may create an oily sheen on the ground or water, and may result in discoloration of vegetation. The pilot who has conducted aerial inspections for Olympic for several years has considerable experience conducting pipeline inspections, and has frequently observed oily sheens, discoloration or other suspicious conditions along the pipeline route that have required follow-up investigation. Upon further investigation, we have been able to determine than the conditions noticed by our pilot have typically been the result of activities unrelated to the pipeline, but these experiences have convinced me that it is possible to detect relatively small product releases by flying the route.

Q. The fourth leak detection method you mentioned was the use of internal line inspection devices. Can you tell me more about that?

A. Sure. At least once every five years, Olympic runs internal line inspection tools (commonly known as "smart pigs") through the existing pipeline system. Olympic uses both magnetic flux leakage pigs and calipers pigs. Again, the primary purpose of these internal inspections is leak prevention. The pigs detect wall thickness loss or pipe dents or fissures that may result in leaks in the future. Olympic can then inspect those areas further and repair damage before any product

is released. In addition to leak prevention, however, internal inspections are capable of detecting small holes or breaks in the pipe that may be releasing product to the surrounding environment.

Q. The fifth leak detection method you mentioned was the use of static pressure tests. What are those?

A. In a static pressure test, product is simply held in the pipeline at a constant pressure for a set period of time, and pipeline conditions are monitored for pressure and volume changes that would indicate that product is escaping from the system. I understand that Olympic has committed to conducting monthly static tests of the entire Cross Cascade Pipeline, as well as quarterly static tests isolating each line segment between block valves. In practice, Control Center operators also routinely conduct less formal static tests in conjunction with various maintenance operations on the pipeline.

Q. Are these static tests the same sort of "shut in" tests that Mr. Batten testified that Yellowstone pipeline had committed to conducting?

A. Yes, based on the limited information provided in Mr. Batten's testimony, they appear to be the same sort of tests.

Q. The final leak detection method you mentioned was third-party reporting. Is this an effective leak detection method?

A. Yes. Olympic has an active community information program. Through public meetings, informational mailings, in-person communications and signage along the route, Olympic attempts to ensure that third parties living or working near the pipeline route are aware of the pipeline's presence and are encouraged to report any unusual conditions to Olympic. Olympic operates a toll free telephone line directly into the Control Center, with operators standing by 24 hours-a-day ready to respond to reports of any usual conditions along the pipeline route that might indicate that a release may have occurred or is likely to occur. In fact, some of the releases on the Olympic system have been promptly reported by third-parties.

Additional Leak Detection Measures

Q. Are you familiar with other leak detection methods and technology?

A. Yes. Part of my job is to keep abreast of new technology and industry practices. Each year, I attend industry conferences and meet with developers and venders of leak detection systems. I routinely communicate informally with individuals in other companies, such as Equilon, who have responsibilities similar to my own. Finally, Olympic devotes resources to experimenting with and evaluating new technologies, and I participate in that process.

Q. In the testimony filed by other parties to these proceedings, witnesses suggested employing a wide variety of additional leak detection methods. In general, what is your reaction to those suggestions?

A. My reaction is mixed. Some of the recommended leak detection methods have proven to be reliable, and Olympic has already proposed to use them on the Cross Cascade Pipeline. Other recommended technologies have not been proven reliable, would not work well on the Olympic system, or would have disadvantages that would outweigh their potential benefits. Not surprisingly, many of the suggestions come from individuals with little or no experience operating pipelines, and little or no experience with the technology they are suggesting.

Q. Let's talk about some of the specific recommendations. Some witnesses recommended that Olympic use hydrocarbon sensing cables to improve leak detection. Do you agree with this recommendation?

A. No. I am not aware of any pipeline system of this size that utilizes hydrocarbon sensing cables to any significant extent. At Olympic, we have experimented with hydrocarbon sensing cable technology for more than five years now. In our experience, the cables are too sensitive, and tend to be quickly activated by natural oils or oils found in stormwater runoff. Once the cables are contaminated, they do not work at all. Indeed, even testing these systems requires part of the system to be rendered nonfunctional. As a result, the on-going maintenance requirements of

these systems are enormous, and because maintenance requires excavation and replacement of the cable, it would have both environmental and economic costs that would outweigh any perceived benefits. Although I do not believe that the current state of the art in hydrocarbon sensing cables would improve leak detection on the existing or proposed pipeline system, Olympic is continuing to monitor the development of this technology.

Q. In his testimony, Mr. Batten mentioned acoustic leak detection systems. Would such a system be appropriate for the Cross Cascade Pipeline?

A. No. In his testimony, Mr. Batten has provided very little information about the sort of acoustic system he seemed to be recommending. If he is suggesting that the entire 230-mile Cross Cascade Pipeline be protected by an acoustic leak detection system, I am not familiar with any proven acoustic technology for such an application. Acoustic systems are typically designed to monitor a section of pipe no more than a few miles long because computerized equipment, power and communication support must be available at each end of the monitored pipe segment. To install that level of infrastructure every few miles along the 230-mile pipeline would substantially increase the environmental impacts of the project as well as its costs. Even if Mr. Batten were recommending that Olympic use acoustic systems at only a few discrete areas, I would nevertheless disagree with that recommendation. Olympic tested an acoustic system a few years ago on some portions of the Olympic system, and we were not happy with its performance. The system did not meet Olympic's requirements due to facility equipment and automation. Routine procedures such as meter proving or pump switching introduced waves into the system that produced false alarms. The only way to adjust the system to avoid these false alarms would also reduce the accuracy and capability of the system. Olympic will continue to monitor the development of this technology, but I do not believe that the current state-of-the-art in acoustic leak detection would improve leak detection on either the existing or proposed pipeline.

Q. In his testimony, Mr. Batten also mentioned a clamp-on flow meter system used to detect leaks. Would such a system be appropriate for use on the Cross Cascade Pipeline?

A. No. Again Mr. Batten provides little explanation about the use of clamp-on flow meters as leak detection devices. In fact, these meters do not detect leaks, they simply provide data that another leak detection system might use. Olympic obtains flow measurements by in-line flow meters instead of clamp-on flow meters because in-line flow meters have proven to be more accurate and reliable. Clamp-on flow meters have not yet reached a point of demonstrated reliability, and are not accepted by the petroleum industry as sufficiently accurate for use for custody transfer measurements on pipelines. Adding clamp-on flow meters to Olympic's system would introduce less reliable data into the SCADA system and the PLDS, and would thereby increase the likelihood of false alarms without increasing the ability to detect leaks.

Q. In his testimony, Mr. Batten mentions the use of "pressure point and mass volume balancing" to detect leaks. Would such an approach be appropriate for the Cross Cascade Pipeline?

A. As far as I can tell, Mr. Batten is not recommending anything new. Olympic's SCADA and PLDS both involve mass volume balancing principles and pressure measurements.

Q. In his testimony, Mr. Batten recommends that the Control Center have an "ergonomic design or [that] human performance consideration [be] given to the control room layout, its lighting, system screen displays, keyboard inputs, or controller reaction to system visual and audible alarms." Do you agree with this recommendation?

A. Yes, I do. A control center should be designed to help Operators do their job and remain alert and attentive while doing so. When Olympic brought the current SCADA system on line in 1989, we also redesigned the Control Center work area. We worked with Evans Brothers, a firm that specializes in designing modular furniture for 24-hour-a-day applications, and we designed a work station with the Operators' needs in mind. Over time, we have continued to modify the

work space in response to the suggestions and concerns of Operators. In the past year, for example, we improved the lighting and eliminated some of the windows in the Control Center to reduce glare on the computer monitors.

DATED: March 24, 1999

_____
Ronald Brentson